

Washington, May 7, 1957

Pilot-Type Field Tests on Screw-worm Eradication Methods Begin in Florida:

Pilot-type field tests to evaluate and improve procedures and equipment for screw-worm eradication by using sterile male screw-worm flies have been started in a 2,000-square-mile area of Florida, it was announced today by the U.S. Department of Agriculture and the Florida Livestock Board. Screw-worms are the larvae, or maggots, of the fly Callitroga hominivorax which develop from eggs laid on open wounds on animals. They cause heavy losses to producers of livestock in infested areas, especially in Florida and Texas.

In the Florida tests, to be undertaken primarily for research and training purposes, researchers and technicians will be using basic techniques that successfully wiped out the screw-worm on the 170-square-mile Caribbean island of Curacao in 1954. The cooperative investigations to be undertaken in Florida constitute another step toward developing the most efficient and practical way to utilize sterile male screw-worm flies to rid the southeastern United States of this destructive livestock pest. Although the primary purpose of the study is to develop improved methods, it is expected that some relief from screw-worm losses will result in the experimental area.

A total of about 2,000,000 laboratory-reared screw-worm flies a week will be required when the pilot-scale field operations reach their peak. These flies, rendered sterile by radioactive treatment, will be released at the rate of 500 males per square mile each week for four months on a pre-determined pattern that will insure uniform distribution in the test area. A 400-per-square-mile rate proved adequate for eradication of the fly on Curacao. The area to be treated, 40 by 50 miles, is located east and south of Orlando, and has been found to be heavily infested with the screw-worm.

Scientists of USDA's Agricultural Research Service point out that screw-worm populations in the test area may not be greatly reduced--as screw-worm flies can

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move into and out of the test block--but valuable information on control procedures adaptable in a large area can be obtained. Researchers can, for example, compare reductions in the percentage of fertile screw-worm eggs and in the screw-worm fly populations near the center of the test block to the percentage outward beyond the confines of the test area, thus getting valuable data that might be applied on an area of regional proportions.

Besides being a proving ground for procedures and equipment, the operation will give personnel training and experience in use of techniques, which would be invaluable should an all-out program of eradication be authorized and undertaken sometime in the future. Department of Agriculture officials point out however, that the Department is not now in position to launch an all-out eradication program.

The 1957 Florida field test also will give scientific personnel concerned with screw-worm research a chance to improve techniques of rearing and sterilizing the male flies in the laboratory in large quantities on a regular schedule. It will provide an opportunity for testing and perfecting automatic devices for releasing flies from aircraft--equipment that is not now available but which would be necessary in any all-out eradication effort.

Eradication of the screw-worm by the method involved in the Florida research is based on the simple fact that when normal females of the species mate with sterile males, the eggs produced will not hatch. If enough sterile male flies can be introduced into a screw-worm infested area at proper intervals, they will cause a progressive reduction in the laying of fertile eggs, and the fly population eventually will be wiped out.

Sterile flies in the 1957 investigations will be dispersed from aircraft flying a pattern found to be successful in Curacao. The planes will carry relatively light loads of the sterilized male insects which will be dispersed at relatively high altitudes--generally about 1,000 feet--at intervals of 1 mile or more. The area to be

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covered is largely lightly populated range land. Standard surveying techniques on the ground, including checking of animals, will be used to determine results of the work.

The State of Florida, through the State Livestock Board, is cooperating with USDA in the 1957 tests, and is furnishing about \$22,000 to help finance the Federal-State operations. These funds will be used for equipment, materials, and salaries. The Federal Government, through the Agricultural Research Service, is supplying technical personnel as well as materials and facilities.

Headquarters of the operation will be at Orlando, and flying will be done from a nearby air-strip by contract planes. The field research will be in charge of the same Department of Agriculture officials who have conducted the laboratory investigations on screw-worm. It will be directed by R.C. Bushland of the Entomology Research Division, Kerrville, Texas.

The 1957 experiments are of widespread interest to livestock producers in the Southeast, and the full cooperation of producers and other agricultural interests in Florida and especially the test area is expected to contribute to success of the undertaking.

Further background information on this research project follows:

Department of Agriculture officials emphasize that the 1957 screw-worm pilot project in Florida is not an all-out eradication program.

An all-out eradication program--even if it were confined to Florida--would be a tremendous undertaking. Department scientists have estimated, for example, that a southeast regional effort would require the production of at least 50,000,000 sterile flies a week. This compares with release of only 200,000 male flies a week in the Curacao program. The area that would need treatment would include a total of some 50,000 square miles and involve four Southeastern States--Florida, South Carolina,

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Georgia, and Alabama. In the Curacao program only 170 square miles were involved--all of this area on an island not readily subject to reinfestation.

Should a regional eradication program become possible, authority and funds not now available would be required. USDA scientists have estimated that an eradication program for the Southeast would cost about 9 to 10 million dollars. It probably could be completed in two years, not including the time required to construct necessary buildings and other facilities. Moreover, after such a program was completed, constant vigilance would have to be maintained to prevent reinfestations in the screw-worm-free area. This would require enforcement of quarantines, inspection of all livestock entering the Southeast from screw-worm infested areas of the west, continuous screw-worm surveys, and stand-by facilities so as to eradicate the pest promptly should it show up again in any locality. This quarantine and survey work would require an estimated \$750,000 annually. Such a program would necessitate not only the full cooperation of all the States involved but also that of all ranchers in prompt treatment of exposed stock in order to keep down infestations.

Researchers have made significant advances in the mass-rearing and sterilization of screw-worm flies since 1954, and they continue to improve methods and facilities. An all-out program would require greatly expanded rearing facilities. The scientists have estimated that facilities and equipment to rear flies for a large regional program would cost in the neighborhood of a million dollars. Such a plant would provide facilities for 24-hours-a-day operation. Requirements would include storage, preparation, and dispensing of nutrients on which the flies are raised, including 40 tons per week of ground beef hearts and 15 tons of bovine blood.

In any size operation--field tests such as those being carried on in Florida or an all-out program--the rearing and sterilization process is the same. In the laboratory screw-worm eggs hatch in one day. The larvae feed for five days, then change to pupae which become flies in seven more days. At five days, the oblong,

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Hard-coated pupae are subjected to irradiation by exposure to gamma rays from radioactive cobalt. Treatment of the flies with the radioactive cobalt requires special facilities and safety precautions in order to avoid radiation hazards for the workers. About six minutes of exposure causes the flies that later emerge from the pupae to be sterile. The treated flies--about half of them males--are packaged into containers for shipment to release points from which they are dispersed by airplane. The flies can lay eggs when five or six days old, completing the life cycle in about three weeks.

The screw-worm lives only in the living flesh of warm-blooded animals, and the fly lays her eggs on a wound of an animal. A scratch, a tick bite, or any open wound--large or small--invites attack by this parasite. It can cause large losses in cattle, hogs, sheep, and goats, as well as in wild animals.

In recent years livestock production in Florida has increased rapidly until now income from this source is exceeded only by that from citrus fruits and tourists. Livestock production also is on the increase in other Southeastern States. Consequently, any limiting factor such as the screw-worm is a problem of major concern. It has been estimated, for example, that 80 to 85 percent of all wounds of cattle in Florida were infested between June 1, 1956, and May 1, 1957--a period of high activity of the pest. The screw-worm situation in Florida this spring is said to be the worst since this pest entered the State in 1933. Losses in Florida alone in 1956 may top \$10 million.

An intensive screw-worm educational and control program--not an attempt at eradication of the pest--was conducted in Florida from 1935 to the spring of 1938, and resulted in drastic reduction in screw-worm numbers. However, in years that followed, the screw-worm population built up again, and--assisted by several mild winters--it now is at a record high.

Under normal conditions, screw-worm losses can be greatly reduced, in domestic

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livestock, although under Florida conditions it is an extremely costly operation. Early detection and prompt treatment of all infested wounds are necessary to keep losses to a minimum. (Remedies that have proven successful include EQ-335 and several smears including Smear 62 and Smear 82).

In Florida, control problems are great because livestock graze over vast areas of woodland and swampland where it is difficult, if not impossible, to find and treat all infested animals without extraordinary expense. Unless treated promptly, infested animals--especially the new born--die from the screw-worm infestation or complications arising from it.

The screw-worm also thrives in wounds of wildlife, which adds to the difficulty of controlling the pest in domestic animals.

Screw-worms have been known in Texas since 1842. They also are found in New Mexico, Arizona, and California, occasionally overwintering in the southern extremities of those three States as well as in Florida and Texas.

The southeastern areas usually screw-worm infested by fall include all of Florida, the southern tip of South Carolina, the southern half of Georgia, and the southeastern part of Alabama.

Eradication in the Southwest is not considered feasible at this time because of the perennial reinvasion of the fly from Mexico.

UNITED STATES DEPARTMENT OF AGRICULTURE

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Washington, October 9, 1957

Preparations Started for Eradication of Screwworm in Southeast:

Plans are being drawn and preliminary work is under way for a program to eradicate the screwworm, a serious pest of livestock and wildlife, in the southeastern United States, the U. S. Department of Agriculture and the Florida Livestock Board, cooperators in the effort, announced jointly today.

Screwworm infestation of livestock in the Southeast causes an estimated annual damage of \$10 million to \$20 million in animals killed, deformed, and made susceptible to other diseases; in lowered production; and in costs of extra labor and medication. The screwworm is the maggot of the fly Callitroga hominivorax, which lays its eggs on and around open wounds in warm-blooded animals.

The Florida Legislature has voted an appropriation of \$3 million for 2 years of this work, and the U. S. Congress has voted \$1.6 million for the first year.

Eradication activities will take place almost entirely in peninsular Florida, because the screwworm seldom overwinters north of Gainesville, Fla. However, the program is visualized as extending 100 miles north of the average overwintering line, to include most of the northern Florida peninsula and the southeastern corner of Georgia.

These two zones encompass an area of 50,000 square miles. Should a mild winter occur in the course of eradication operations, permitting the fly to overwinter farther north, it may be necessary to extend operations farther into Georgia, southeastern Alabama, and southeastern South Carolina, in an area including an additional 25,000 square miles.

The eradication program is based upon a simple fact in the life cycle of the screwworm fly--that the females mate only once. Scientists reasoned that if native females were mated with males sterilized by atomic radiation, they could not reproduce. If a preponderance of sterile males could be maintained long enough, the fly would be exterminated. Pilot operations in Florida since 1950 and on the Caribbean

island of Curacao in 1954 proved this to be true.

At maximum operation, which is hoped to be reached in the summer of 1958, it is planned to release sterilized laboratory-reared male flies at the rate of 25 million a week on the primary eradication area of 50,000 square miles. The flies will carry no radioactivity and are not household pests.

To turn out this enormous number of flies, large assembly-line operations will be required around the clock, seven days a week. Sterilized flies ready for distribution will be placed in paper cartons, of which more than 100,000 will be needed per week. Trucks will deliver them daily to six distribution points. Leased airplanes fitted with automatic dispensers will release the insects at an altitude of about 1,000 feet. Release rates will vary from 200 to 800 sterile males per square mile, depending on the population density of native screwworms in the area, which will be previously determined by ground surveys. Progress will be measured by ground crews, who will survey each area and observe reductions in the viability of egg masses deposited by female flies.

In order to hasten eradication of this serious pest, livestock owners will be urged to cooperate by using approved conventional methods to reduce screwworm populations. Owners will be requested to keep records of the number of screwworm infestations occurring in their herds each week. Some will be asked to collect larvae and eggs from infested wounds. This information, and that gathered by the ground crews, will be used to determine the number of sterile flies to be released over a given area and to estimate the length of time such releases may be required.

During and after eradication it will be necessary to protect the Southeastern States from reinfestation. Inspection stations will be established along the Mississippi River and at other points to examine east-bound animals enroute from infested areas in the Southwest. Infested animals will be treated until they are free of screwworms.

Screwworms are a century-old pest in the Southwest. They have been known in Texas since 1843, and they also occur in Arizona, California, and New Mexico. Infested animals brought the screwworm to the Southeast in 1933. Eradication in the Southwest is not considered feasible because of reinvasions from Mexico.

(NOTE: Photos of infected animals, screwworms, etc., are available on request to Photographic Division, Office of Information, U. S. Department of Agriculture, Washington 25, D. C. Ask for Numbers N-13072, DN-687, BN-1412, BN-1416, BN-1417, BN-1418, BN-1419).

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For P.M. Release December 3

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Pilot-Area Eradication of Screwworms Reported by U. S. Scientists:

Methods of mass-rearing and releasing screwworm flies and their effect after release, of interest because some of the methods will be used in the current Screw-worm Eradication Program in the Southeast, were described by U. S. Department of Agriculture scientists at the annual meeting of the Entomological Society of America in Memphis, Tenn., today.

The discussions covered work done during 1957 pilot-plant operation on 2,000 square miles southeast of Orlando, Fla., to test large-scale methods of screwworm eradication by releasing radioactively sterilized male flies. This work followed the eradication of the screwworm on the Caribbean island of Curacao, with an area of 170 square miles, in 1954. The forthcoming operation, covering 50,000 square miles, should reach maximum operation in the summer of 1958.

Methods of culturing and rearing 2 million sterilized flies a week for 15 consecutive weeks were given by entomologists. The laboratory brood stock was composed of a composite strain of flies taken from several areas of Florida and adapted to a laboratory environment. The flies were kept in 20 colony cages, each stocked with 700 flies. Female flies were induced to lay their eggs on a special meat medium placed in the colony cages. Each female laid 200 to 300 eggs, of which more than 99 percent hatched. Larvae were grown on a ground-meat mixture, of which they consumed 106,600 pounds in the production of 37.5 million flies during the 15-week period. Pupae were held until they were $5\frac{1}{2}$ days old, and were then irradiated with 6,200 to 8,300 roentgens of gamma rays from cobalt-60. With 18,000 pupae irradiated at a time for a period of $6\frac{1}{2}$ minutes, actual irradiation time was 16 hours a week for 2 million sterilized flies. Pupae were then placed in release cartons, in which they emerged as sterile flies. The boxes, about the size of those containing frozen foods, accommodate 500 live flies each; dividers similar to those in egg boxes multi-

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plied the resting space to 200 square inches in each carton.

Various methods of fly dispersal have been tried, including a tunnel-like distributor designed to operate by air pressure in flight, a manually operated hopper device, and, finally, a motor-driven mechanism that can be set for various rates of dispersal and that counts and opens the cartons as they are released. These developments grew out of the need for a faster and more accurate release method than that used on Curacao--tearing open paper bags containing flies and tossing them out of the cockpit of an airplane.

Surveys on the ground showed that screwworm activity was exceptionally high when the test began. Ranchers reported 90 to 100 percent infestation of newborn calves. More and more sterile egg masses were collected as airplanes continued to distribute flies on established flight patterns each weekday of the test period. More than 100 ranchers cooperated by keeping records of screwworm cases. The results were gratifying. In spite of reinvasion of the test area by wild flies from three sides, 70 percent sterility was obtained after 12 weeks of fly release at the rate of 548 sterile males per square mile per week. The pilot-plant operation confirmed previous experience that the screwworm can be eradicated by releasing sterile male flies, and provided valuable experience in large-scale application of the principle.

Participating were A.J. Graham and F. H. Dudley, who discussed culture methods for mass-rearing screwworm larvae and C.N. Husman and A.H. Baumhover, who discussed mechanical devices for dispersal of sterilized screwworm flies from aircraft. Mr. Baumhover, Clinton C. Skipper and Weston D. New discussed field observations on the effects of releasing sterile screwworms in Florida.

For P.M. Release, December 3